

AD-A195 887

INSTRUMENTATION FOR COMPUTATIONAL STATISTICAL RESEARCH  
(U) ILLINOIS UNIV AT URBANA DEPT OF STATISTICS J SACKS  
15 NOV 87 AFOSR-TR-88-0637 AFOSR-87-0041

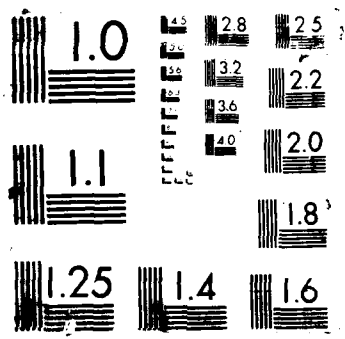
1/1

UNCLASSIFIED

F/G 12/6

NL





UNCLASSIFIED

2

AD-A195 887

REPORT DOCUMENTATION PAGE

1b. RESTRICTIVE MARKING <b>DTIC FILE COPY</b>			
3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release, distribution unlimited			
5. MONITORING ORGANIZATION REPORT NUMBER(S) <b>AFOSR-TR- 88-0657</b> AFOSR			
6a. NAME OF PERFORMING ORGANIZATION Univeristy of Illinois	6b. OFFICE SYMBOL (If applicable)		
7a. NAME OF MONITORING ORGANIZATION AFOSR			
7b. ADDRESS (City, State and ZIP Code) BLDG #410 Bolling AFB, DC 20332-6448			
8a. NAME OF FUNDING/SPONSORING ORGANIZATION AFOSR	8b. OFFICE SYMBOL (If applicable) NM		
9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER AFOSR- 87-0041			
10. SOURCE OF FUNDING NOS.			
PROGRAM ELEMENT NO. 61102F	PROJECT NO. 2304 2917	TASK NO. A5	WORK UNIT NO.
11. TITLE (Include Security Classification) Instrumentation for Computational Stat Rsch		12. PERSONAL AUTHOR(S) Jerome Sacks	
13a. TYPE OF REPORT FINAL	13b. TIME COVERED FROM 7/15/87 to 11/15/87	14. DATE OF REPORT (Yr., Mo., Day) 87/11/15	15. PAGE COUNT 3
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB. GR.	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) <p>This is the final report of a grant issued under the University Research Instrumentation Program. Computing equipment was purchased to establish a network of 14 Sun workstations. This network made a variety of research efforts in the area of design and analysis of computational experiments. This report details purchases and related publications.</p> <p><i>Background: grant was for...</i></p> <p><i>...to establish a network of 14 Sun workstations...</i></p> <p><i>...to establish a network of 14 Sun workstations...</i></p>			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL James M Crowley, Maj, USAF		22b. TELEPHONE NUMBER (Include Area Code) 202-767- 5025	22c. OFFICE SYMBOL <b>UNCLASSIFIED</b>

INSTRUMENTATION FOR COMPUTATIONAL STATISTICAL RESEARCH

PI: Jerome Sacks

Department of Statistics  
University of Illinois  
101 Illini Hall  
725 South Wright  
Champaign, IL 61820

The equipment grant has been used to establish a network of 14 Sun work stations now being used for several research activities. The network has been operational since April 1987. The network is being used both for local computing, for connecting to the local Cray X-MP when large-scale computing is needed, and for providing adequate graphics displays.

One area of research underway is on design and analysis of computational experiments in which methodology is sought to permit adequate inference about complex computational models. Here, inputs to a computer model have to be specified to enable prediction of the behavior of the model at untried inputs. Prediction methods and selection of inputs require extensive computing and there is also a need for good graphics. This research is being carried out under the direction of Professor Sacks. Results on this project have been found in several areas, including the design of VLSI circuits.

Other (and somewhat related) research by Professor Cox involves simulation studies for probability density estimation and for estimation of associated quantities such as the score function  $-f'/f$  where  $f$  is the density. The score function arises in projection pursuit, data analysis, and critical applications of adaptive inference methods and sound procedures are needed for its estimation. The convenience of available software for the Sun and unused CPU's available on the network provides an excellent setting.

Research under the direction of Professor Andrew Barron has led to software for estimating probability density functions using variable dimensions exponential families. A new technique is being developed on the computer to perform multivariate density estimation using a network of univariate exponential family estimators.

Research by Professor Stout on psychological testing is being directed in part towards developing code for a portable version of explicit methods devised by Stout to uncover test bias. A large scale trial Monte Carlo simulation of Stout's statistical test of educational test unidimensionality was conducted. The positive results were crucial to the publication of this research and the use of Stout's methods by educational practitioners.

A list of publications, completed or in preparation is attached.

# Research Completed and in Progress

- Barron, A. R. "Are Bayes rules consistent in information?" Open Problems in Communication and Computation (T. M. Cover and G. Gopinath, editors), Springer-Verlag, New York, 1987, pp. 85-91.
- Barron, A. R. "Uniformly powerful goodness of fit tests." Annals of Statistics. [Tentatively accepted]
- Barron, A. R. "The exponential convergence of posterior probabilities with implications for Bayes estimators of density functions." Submitted to the Annals of Statistics.
- Cox, D. and Martin, R. D. "Estimation of score functions." (In preparation)
- Lim, Y. B., Sacks, J., Welch, W. "Asymptotic designs for production in computer experiments." (Manuscript)
- Marden, J. I. and Brown, L. D. "Complete Class Results for Hypothesis Testing Problems with Simple Null Hypotheses. Ann. Statist. [Tentatively Accepted]
- Marden, J. I. and Brown, L. D. "Local Admissibility and Local Unbiasedness in Hypothesis Testing Problems." (Manuscript)
- Martinsek, Adam T. "Sequential Estimation in Regression Models Using Analogues of Trimmed Means." (Manuscript)
- Portnoy, Stephen. "Using regression quantities to identify outliers," Stat. Data Anal. Based on the L<sub>1</sub> Norm and Related Methods, (ed: Dodge) North Holland, Amsterdam, 1987, 345-356.
- Portnoy, Stephen. (with J. Jureckova). "Asymptotics for one-step M-estimators in regression with applications to combining efficiency and high breakdown," Comm. Stat. Th. and Meth., 16, (1987) 2187-2200.
- Sacks, J., Schiller, S. and Welch, W. "Designs for Computer Experiments." (Submitted to Technometrics)
- Simpson, Douglas G. and Dallal, Gerard E. "BUMP: A FORTRAN Program for Identifying Dose-Response Curves Subject to Downturns." Computers and Biomedical Research. (In Review)
- Simpson, Douglas G. "Hellinger Deviance Tests: Efficiency, Breakdown Points and Examples." JASA. (In Review)
- Stout, William. "A nonparametric approach for assessing latent trait unidimensionality. Psychometrika, December, 1987 (To appear)



Availability Codes	
Dist	Avail and/or Special
A-1	

Ying, Z. and Lai, T. L. "Linear Rank Statistics in Regression Analysis with Censored or Truncated Data." Technical Report. 1987.

Ying, Z. "A Note on the Asymptotic Properties of the Product-Limit Estimator on the Whole Line." Technical Report. 1987.

Yu, T-K, Welch, W., Kang, S., Sacks, J. "Computer experiments for quality control." (Manuscript)

END

DATE

FILMED

9-88

DTIC